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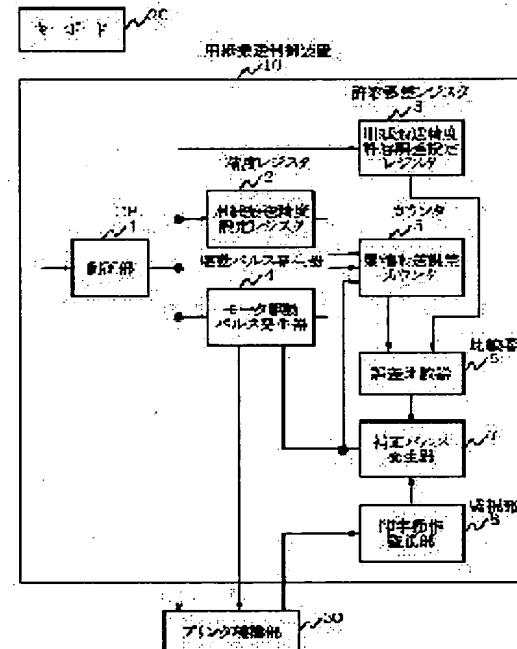
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(54) PAPER FEED CONTROL METHOD FOR PRINTER AND CONTROL APPARATUS

(57)Abstract:

PROBLEM TO BE SOLVED: To accurately print a medical examination result within the printing frame of a slip by automatically correcting a mechanical line feed interval to eliminate the error with the interval between printing lines.

SOLUTION: The paper feed accuracy of a printer mechanism part 30 is preset to an accuracy register 2 and the tolerance error corresponding to the kind of printing paper to be used is preset to a tolerance error register 3 and a medical examination result is inputted from a keyboard 20 to issue a command for the start of printing and a drive pulse is sent to a stepping motor to perform the line feed operation of printing paper and a cumulated feed error is calculated based on the paper feed accuracy stored in the accuracy register 2 and the number of drive pulses to be compared with a tolerance error and, when the difference between both errors becomes larger than a predetermined value, a correction pulse is generated to correct a drive pulse.



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CLAIMS

[Claim(s)]

[Claim 1] The form conveyance precision of the corresponding printer device section is beforehand set as the form conveyance precision setting-out register. The allowable error corresponding to the class of at least one kind of print sheet to be used is beforehand set as the form conveyance precision allowable-error setting-out register. Input the numeric value of a medical checkup result from a keyboard, order it initiation of printing, send a driving pulse to the step motor of said printer device section, and line feed actuation of said print sheet is made to perform. An accumulation conveyance error is computed with the form conveyance precision memorized to said form conveyance precision setting-out register, and the pulse number of said driving pulse. Said accumulation conveyance error is compared with the allowable error set as said form conveyance precision allowable-error setting-out register. The form transfer-control approach of the printer characterized by including sending said driving pulse which generated the amendment pulse when those differences became larger than a predetermined value, and was amended by said amendment pulse to said step motor.

[Claim 2] The form transfer-control approach of the printer according to claim 1 characterized by including resetting the calculation value of said accumulation conveyance error to 0 when said amendment pulse is generated.

[Claim 3] When the difference of said accumulation conveyance error and said allowable error becomes larger than a predetermined value, When waiting for said printer device section to end printing of one line, generating said amendment pulse and resetting the calculation value of said accumulation conveyance error, The compensation error amount corresponding to the amount of line spacing of said printer device section during the event of generating the event of the difference of said accumulation conveyance error and said allowable error becoming larger than a predetermined value, and said amendment pulse as initial value of said accumulation conveyance error The form transfer-control approach of the printer according to claim 1 characterized by including setting.

[Claim 4] The form transfer-control approach of the printer according to claim 1, 2, or 3 characterized by including printing by choosing the allowable error corresponding to the class of print sheet with which it has equipped then when setting beforehand the allowable error corresponding to said two or more kinds of print sheets as said form conveyance precision allowable-error setting-out register and using a printer.

[Claim 5] The form conveyance precision setting-out register which has memorized beforehand the form conveyance precision of the printer device section to connect, The form conveyance precision allowable-error setting-out register which has memorized beforehand the allowable error over the reference value of the line spacing of the format beforehand printed to at least one kind of print sheet, The motor driving pulse generator which subtracts and adds the pulse number of said amendment pulse which inputted said driving pulse when an amendment pulse was inputted for a driving pulse from a delivery amendment pulse generator to the line feed drive motor of said printer device section, The accumulation conveyance error counter which carries out counting of the accumulation conveyance error over the mileage between services of said print sheet from the error amount from said form conveyance precision setting-out register, and

said driving pulse from said motor driving pulse generator. The error comparator which sends out a trigger signal to said amendment pulse generator when said accumulation conveyance error which carried out counting in said accumulation conveyance error counter is compared with said allowable error set as said form conveyance precision allowable-error setting-out register and those differences become larger than a predetermined value. Said amendment pulse generator which inputs said trigger signal from said error comparator, and sends out the amendment pulse of a predetermined pulse number to said motor driving pulse generator. Form transfer-control equipment of the printer characterized by having the control section which controls actuation of said form conveyance precision setting-out register, said form conveyance precision allowable-error setting-out register, and said motor driving pulse generator, and gives a printing command to said printer device section.

[Claim 6] Form transfer-control equipment of the printer according to claim 5 characterized by having said accumulation conveyance error counter which inputs said amendment pulse and is reset to 0.

[Claim 7] When the difference of said accumulation conveyance error and said allowable error becomes larger than a predetermined value, Said amendment pulse generator which waits for said printer device section to end printing of one line, and generates said amendment pulse, and when inputting and resetting said amendment pulse, The compensation error amount corresponding to the amount of line spacing of said printer device section during the event of inputting the event of the difference of said accumulation conveyance error and said allowable error becoming larger than a predetermined value and said amendment pulse is made into initial value. Form transfer-control equipment of the printer according to claim 5 characterized by having said accumulation conveyance error counter to set.

[Claim 8] Form transfer-control equipment of the printer according to claim 5, 6, or 7 characterized by choosing the allowable error corresponding to the class of print sheet with which it has equipped then when it has said form conveyance precision allowable-error setting-out register which has memorized beforehand the allowable error corresponding to said two or more kinds of print sheets and said printer is used.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention is used for the printer which prints to the continuous-form form which has printed the predetermined printing frame for printing (format) beforehand, and relates to the form transfer-control approach and control unit which can amend the instrumental error of form conveyance automatically.

[0002]

[Description of the Prior Art] The continuous-form form which has printed the predetermined printing frame (format) beforehand for printing of a medical checkup result is used for the printer attached to the medical checkup equipment used at the time of the medical checkup of the amount of a waterworks or the electrical and electric equipment used, and it is used for the operation which inputs and prints the tap water of a medical checkup result, and the amount of electric [used], and is passed to a customer.

[0003] The conventional printer used for such an application is small as much as possible so that conveniently [carrying], and a lightweight thing is required, therefore roll-like continuous form is used and, as for the print sheet used for it, the thing [that the amount used is the minimum amount used] is searched for per sheet. For this reason, line spacing is made as small as possible, and the format beforehand printed to the print sheet also has little amount of the form used, and he is trying to end.

[0004]

[Problem(s) to be Solved by the Invention] if the conventional printer which was mentioned above has an error in mechanical line spacing spacing of a printer, and the line spacing currently printed beforehand -- many -- when printing of the document of several sheets is performed continuously, the error accumulates, a printer graphic and the closing line of the printing frame of a document lap, and it has the trouble of a printing result becoming hard to see and incurring a customer's displeasure. It is a different amount for every printer according to individual, and since especially a gap (printing gap) of mechanical line spacing spacing resulting from the fabrication error of each part article which constitutes a printer does not have a means to amend it, about the large machine of especially an error, its frequency which makes a customer trouble is high.

[0005] The object of this invention is to offer the form transfer-control approach and control unit of a printer in order to improve the fault of the above conventional printers.

[0006]

[Means for Solving the Problem] The form transfer-control approach of the printer of this invention sets beforehand the form conveyance precision of the corresponding printer device section as the form conveyance precision setting-out register. The allowable error corresponding to the class of at least one kind of print sheet to be used is beforehand set as the form conveyance precision allowable-error setting-out register. Input the numeric value of a medical checkup result from a keyboard, order it initiation of printing, send a driving pulse to the step motor of said printer device section, and line feed actuation of said print sheet is made to perform. An accumulation conveyance error is computed with the form conveyance precision

memorized to said form conveyance precision setting-out register, and the pulse number of said driving pulse. Said accumulation conveyance error is compared with the allowable error set as said form conveyance precision allowable-error setting-out register. When an amendment pulse is generated when those differences become larger than a predetermined value, and said amendment pulse is especially generated including sending said driving pulse amended by said amendment pulse to said step motor, [whether the calculation value of said accumulation conveyance error is reset to 0, and] Or when the difference of said accumulation conveyance error and said allowable error becomes larger than a predetermined value, When waiting for said printer device section to end printing of one line, generating said amendment pulse and resetting the calculation value of said accumulation conveyance error, It is what sets the compensation error amount corresponding to the amount of line spacing of said printer device section during the event of generating the event of the absolute value of the difference of said accumulation conveyance error and said allowable error becoming larger than a predetermined value, and said amendment pulse as initial value of said accumulation conveyance error. Again When setting beforehand the allowable error corresponding to said two or more kinds of print sheets as said form conveyance precision allowable-error setting-out register and using a printer, it includes printing by choosing the allowable error corresponding to the class of print sheet with which it has equipped then.

[0007] The form conveyance precision setting-out register which has memorized beforehand the form conveyance precision of the printer device section which connects the form transfer-control equipment of the printer of this invention, The form conveyance precision allowable-error setting-out register which has memorized beforehand the allowable error over the reference value of the line spacing of the format beforehand printed to at least one kind of print sheet, The motor driving pulse generator which subtracts and adds the pulse number of said amendment pulse which inputted said driving pulse when an amendment pulse was inputted for a driving pulse from a delivery amendment pulse generator to the line feed drive motor of said printer device section, The accumulation conveyance error counter which carries out counting of the accumulation conveyance error over the mileage between services of said print sheet from the error amount from said form conveyance precision setting-out register, and said driving pulse from said motor driving pulse generator, The error comparator which sends out a trigger signal to said amendment pulse generator when said accumulation conveyance error which carried out counting in said accumulation conveyance error counter is compared with said allowable error set as said form conveyance precision allowable-error setting-out register and those differences become larger than a predetermined value, Said amendment pulse generator which inputs said trigger signal from said error comparator, and sends out the amendment pulse of a predetermined pulse number to said motor driving pulse generator, It is a thing equipped with the control section which controls actuation of said form conveyance precision setting-out register, said form conveyance precision allowable-error setting-out register, and said motor driving pulse generator, and gives a printing command to said printer device section. In said accumulation conveyance error counter which inputs said amendment pulse and is especially reset to 0 Or when the difference of said accumulation conveyance error and said allowable error becomes larger than a predetermined value, Said amendment pulse generator which waits for said printer device section to end printing of one line, and generates said amendment pulse, and when inputting and resetting said amendment pulse, It is a thing equipped with said accumulation conveyance error counter which sets the compensation error amount corresponding to the amount of line spacing of said printer device section during the event of inputting the event of the difference of said accumulation conveyance error and said allowable error becoming larger than a predetermined value, and said amendment pulse as initial value. Again When it has said form conveyance precision allowable-error setting-out register which has memorized beforehand the allowable error corresponding to said two or more kinds of print sheets and said printer is used, the allowable error corresponding to the class of print sheet with which it has equipped then is chosen.

[0008]

[Embodiment of the Invention] Next, the gestalt of operation of this invention is explained with

reference to a drawing.

[0009] The block diagram in which drawing 1 shows 1 operation gestalt of the form transfer-control equipment of the printer of this invention, and drawing 2 are flow charts which show actuation of the operation gestalt of drawing 1.

[0010] The form transfer-control equipment 10 of drawing 1 is equipped with a control section (CPU) 1, the form conveyance precision setting-out register (precision register) 2, the form conveyance precision allowable-error setting-out register (allowable-error register) 3, the motor driving pulse generator (driving pulse generator) 4, the accumulation conveyance error counter (counter) 5, the error comparator (comparator) 6, the amendment pulse generator 7, and the printing performance monitor section (Monitoring Department) 8.

[0011] CPU1 controls actuation of the precision register 2, the allowable-error register 3, and the driving pulse generator 4, and gives a command to the printer device section 30 which performs printing actuation.

[0012] The precision register 2 has memorized the error over the precision of form conveyance of each machine number (machine) of every of the printer device section 30 which connects this form transfer-control equipment 10, i.e., the reference value of line spacing. This error is inputted and set as the precision register 2 of the form transfer-control equipment 10 which measures and corresponds for every machine number of the printer device section 30, when the printer device section 30 is manufactured.

[0013] The allowable-error register 3 has memorized beforehand the error (allowable error) permitted to the reference value of the line spacing in the format beforehand printed to the print sheet for printing a medical checkup result etc. in the printer device section 30. This allowable error is common to all machines to one kind of format.

[0014] The driving pulse generator 4 makes line feed actuation of delivery and a print sheet perform a driving pulse to the step motor which is a line feed drive motor of the printer device section 30. As for the printer device section 30, the amount of line feed is decided with the number of the driving pulses from this driving pulse generator 4. The driving pulse generator 4 sends the driving pulse which subtracted and added the inputted pulse number to the printer device section 30, when an amendment pulse is inputted from the amendment pulse generator 7.

[0015] A counter 5 carries out counting of the accumulation conveyance error over the mileage between services of a print sheet with the error amount from the precision register 2, and the number of driving pulses from the driving pulse generator 4. Namely, an accumulation conveyance error is computed by multiplying the error amount set as the precision register 2 by the number of the driving pulses given to the line feed drive motor of the printer device section 30 from the driving pulse generator 4. A counter 5 is reset when an amendment pulse is sent to the driving pulse generator 4 from the amendment pulse generator 7.

[0016] A comparator 6 sends out a trigger signal to the amendment pulse generator 7, when the accumulation conveyance error which carried out counting in the counter 5 is compared with the allowable error set as the allowable-error register 3, the absolute value of those differences becomes larger than a predetermined value and a monitor result ends printing of one line for the operating state of the printer device section 30 in the printing performance monitor section 8.

[0017] The amendment pulse generator 7 sends out the amendment pulse of a predetermined pulse number to the driving pulse generator 4, if a trigger signal is inputted from a comparator 6.

[0018] The Monitoring Department 8 is supervising the operating state of the printer device section 30, and when the printer device section 30 ends printing of one line, it sends out a trigger signal to the amendment pulse generator 7.

[0019] Next, the medical checkup operation of the amount of the tap water used is taken for an example, and actuation of the form transfer-control equipment constituted as mentioned above is explained with reference to the flow chart of drawing 2.

[0020] Before starting the activity of this form transfer-control equipment 10, the printer device section 30, and a keyboard 20, i.e., a printer, the precision register 2 and the allowable-error register 3 are received. The form conveyance precision which makes the form conveyance precision for every machine of the printer device section 30, and the allowable error over a

printing format input and memorize through CPU1 from a keyboard 20, respectively. When the printer device section 30 is manufactured, it measures to each machine number (machine) of every [of the printer device section 30]. The printer device section 30 which constituted each machine part which constitutes the printer device section 30 combining many components since fabrication errors differed to a module for every piece has an error which it was without error to the value from which mechanical line spacing spacing differed for every machine according to individual, and is different to a reference value, respectively. The value is measured at the time of manufacture, and the precision register 2 is made to memorize (step 40a). When actual line spacing spacing of each machine is longer than a reference value, a value with error is made into forward and a value, and when short, it considers as negative and a value. The form transfer-control equipment 10 which once set up form conveyance precision is used as the printer device section 30 and a set, and is not combined with other printer device sections.

[0021] An allowable error is set up corresponding to the class of print sheet to be used (step 40b). Namely, in order to be one value and to use it to one kind of print sheet, limiting a printer to one kind of operation, when using only one kind of print sheet. Although what is necessary is to set up only one value, since it is used for two or more kinds of operation, when exchanging and using two or more kinds of print sheets, the value of two or more allowable errors corresponding to two or more kinds of those print sheets is set up. When using a printer, the value corresponding to the print sheet with which it has equipped then is chosen (step 40c).

[0022] If the printer which such preparation completed is brought, an official trip is taken to a site and the amount of the tap water used is examined, the numeric value of a medical checkup result will be inputted from a keyboard 20 (step 41), and the printing will be ordered initiation from a keyboard 20. CPU1 sends a driving pulse from the driving pulse generator 4 to a step motor, makes line feed actuation of a print sheet perform, and makes the amount of the tap water used print by this while it sends the amount of the tap water used of the medical checkup result inputted from the keyboard 20 to the printer device section 30 (step 42).

[0023] If a driving pulse is sent from the driving pulse generator 4 to a step motor, since the driving pulse will be sent also to a counter 5, a counter 5 computes an accumulation conveyance error by multiplying the error amount of form conveyance precision and the pulse number of a driving pulse which have been memorized to the precision register 2, and sends it to a comparator 6 (step 43).

[0024] When a comparator 6 compares a ***** accumulation conveyance error with the allowable error memorized to the allowable-error register 3 from a counter 5 (step 44) and the absolute value of those differences becomes larger than a predetermined value, A trigger signal to the amendment pulse generator 7 delivery (step 45) and the amendment pulse generator 7. When the signal is inputted, a monitor result is seen for the operating state of the printer device section 30 in the Monitoring Department 8. It waits for the printer device section 30 to end printing of one line, and an amendment pulse is sent out to the driving pulse generator 4 (step 46 (since printing of the line will be confused if form conveyance is amended in the middle of printing of one line, in order to avoid it)).

[0025] If an amendment pulse is inputted from the amendment pulse generator 7, the driving pulse generator 4 will send the driving pulse which subtracted, added and amended the inputted pulse number to the step motor of the printer device section 30, and will amend the error of form conveyance (step 47).

[0026] It can come, simultaneously the signal from the amendment pulse generator 7 is sent also to a counter 5, it is ** and a counter 5 resets enumerated data by this. At this time, it sets to the amendment pulse generator 7, and the error amount (compensation error amount) corresponding to the amount of line spacing of the printer device section 30 generated between the event of a comparator 6 judging with the difference with error having become larger than a predetermined value and the event of the Monitoring Department 8 judging with the printer device section 30 having ended printing of one line is set to a counter 5 as initial value (step 48).

[0027] Next, if it judged whether predetermined printing was completed (step 49), and printing is completed, printing actuation of one affair will be ended and printing will not be completed, it

returns to step 43.

[0028] Although an above-mentioned operation gestalt supervises the operating state of the printer device section 30 by the printing performance monitor section 8, it can give the same function as CPU1, and it can also constitute it so that the printing performance monitor section 8 may be omitted.

[0029] Moreover, when resetting a counter 5 by giving allowances to printing of a format, a compensation error amount is not set but 0 can be set.

[0030]

[Effect of the Invention] As explained above, the form transfer-control approach and control unit of a printer of this invention The form conveyance precision of the corresponding printer device section is beforehand set as the precision register. Moreover, the allowable error corresponding to the class of print sheet to be used is beforehand set as the allowable-error register. Input the numeric value of a medical checkup result from a keyboard, order printing initiation, send a driving pulse to the step motor of the printer device section, and line feed actuation of a print sheet is made to perform. An accumulation conveyance error is computed with the form conveyance precision memorized to the precision register, and the pulse number of a driving pulse. An accumulation conveyance error is compared with the allowable error set as the allowable-error register. By generating an amendment pulse, when those differences become larger than a predetermined value, and sending the driving pulse amended by the amendment pulse to a step motor Since mechanical line spacing spacing is amended automatically and there can be no error with spacing of the print line, a medical checkup result can be printed within the printing limit of a document at accuracy. There is effectiveness to say.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the block diagram showing 1 operation gestalt of the form transfer-control equipment of the printer of this invention.

[Drawing 2] It is the flow chart which shows actuation of the operation gestalt of drawing 1.

[Description of Notations]

- 1 Control Section (CPU)
- 2 Form Conveyance Precision Setting-Out Register (Precision Register)
- 3 Form Conveyance Precision Allowable-Error Setting-Out Register (Allowable-Error Register)
- 4 Motor Driving Pulse Generator (Driving Pulse Generator)
- 5 Accumulation Conveyance Error Counter (Counter)
- 6 Error Comparator (Comparator)
- 7 Amendment Pulse Generator
- 8 Printing Performance Monitor Section (Monitoring Department)
- 10 Form Transfer-Control Equipment
- 20 Keyboard
- 30 Printer Device Section
- 40a-40c, 41-49 Step

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